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(54) Talking tracheostomy tube.

(57) A talking tracheostomy tube (10) is shown in the preferred embodiment as including an inner cannula removably received within an outer cannula. The tracheostomy tube further includes, a first cuff (16) for sealing between the outer cannula and the trachea for substantially preventing air introduced through the inner cannula to escape from the trachea through the larynx.

Air is introduced into the trachea above the first cuff by ports (40) directionally drilled through the outer cannula and in fluid communication with a secondary passageway formed by and between the inner and outer cannulas. The inner end of the secondary passageway is formed by a sealing obstruction integrally formed in the inside surface of the outer cannula adjacent the inner end for the sealing receipt of the inner cannula. The outer end of the secondary passageway is sealed by a collar (42) integrally formed on the outer end of the inner cannula which abuts and seals within a recess of a collar integrally formed on the outer end of the outer cannula.

The tracheostomy tube further includes a second cuff (18) for sealing between the outer cannula and the stoma of the patient for preventing the secondary air introduced through the ports from escaping through the stoma in the neck of the patient.

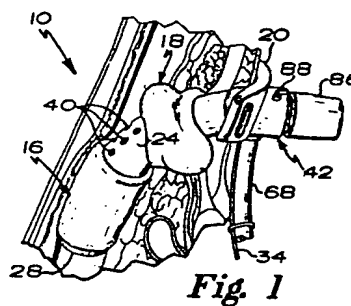


Fig. 1

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1 BACKGROUND

The present invention relates generally to tracheostomy tubes and relates more specifically to talking tracheostomy tubes.

5 Whenever a patient is placed on a ventilator, it is with an obligate loss of speech. This loss of speech may result in great fear, frustration and withdrawal of the ventilated patient. Many techniques of communication have been substituted for speech in an
10 effort to alleviate anxiety of the patient and to facilitate health care delivery. These substitutes include lip reading, writing and the use of hand signals. Unfortunately, few hospital staff are able to lip read, writing is cumbersome, and many times the ventilated
15 patient lacks the strength or ability to comply as is the case with hand signals. Speech with the electrolarynx has also been used. However the electrolarynx takes some time to master and the paralyzed patient finds its use nearly impossible.

20 Other methods to communicate with patients ventilated via a tracheostomy have involved laryngeal speech. Laryngeal speech has been accomplished in three ways. First the cuff of the tracheostomy tube has been partially deflated allowing a minimal air
25 leak around the cuff and through the larynx during the lung filling phase of ventilation. Although this technique does result in speech, the speech is intermittent, dependent on the respirator cycle, does not allow measurement of tidal volumes, and may result in
30 aspiration.

Another method of speech is with a valved, fenestrated tracheostomy tube. The tracheostomy tube used may be equipped with a ventilator activated valve that directs air through a fenestration in the tracheostomy tube and through the larynx during the expiratory
35 phase of ventilation. This method, again, is intermittent, dependent on the phase of the respirator, does not allow measurement of air return during speech, may result in aspiration during the expiration phase,

1 and often could only be used with a Bird respirator
for which it was designed.

Another method of speech involves attaching
a catheter "piggyback" along the length of a tracheos-
5 tomy tube nearly to the cuff. This catheter was then
connected to an air or oxygen source. With the trach-
eostomy tube and catheter in place, air or oxygen
travels via the catheter through the stoma along the
length of the tracheostomy tube. The air or oxygen
10 may then be released into the trachea superior to the
cuff where it flows through the larynx and out the
pharynx. In addition to the production of laryngeal
speech, this technique may be used with any respirator,
speech may be uninterrupted, may be independent of
15 the respirator phase, exact tidal measurements can be
made, there are no moving parts, and finally there is
substantially no chance of aspiration during any phase
of respiration.

However, prior to the present invention,
20 existing "piggyback" type tracheostomy tubes have
encountered the same difficulties of those in the
past. That is, they may produce discomfort at high
air flows through the larynx (i.e. greater than 5
liters/minute) which may be necessary to produce
25 speech. In addition, leakage of air around the stoma
was encountered as was subcutaneous emphysema.

SUMMARY

The present invention solves these and other
problems in tracheostomy tubes by providing a talking
30 tracheostomy tube which introduces air or oxygen above
the sealing member between the tracheostomy tube and
the trachea.

In the preferred embodiment of the present
invention, the tracheostomy tube includes a further
35 sealing member, shown in its most preferred form as
an inflatable cuff, for sealing between the tracheostomy
tube and the stoma of the neck of the patient for
preventing leaks of the air or oxygen introduced for
phonating purposes therethrough.

1 In the preferred embodiment of the present
invention, the air or oxygen for phonating purposes
is introduced to the trachea by a secondary passageway
formed between an inner and an outer cannula. Specifi-
5 cally, the cross section of the inner cannula is comple-
mentary to and for receipt into the outer cannula but
of a smaller size to create the secondary passageway
between the outside surface of the inner cannula and
the inside surface of the outer cannula. The outer
10 and inner ends of the secondary passageway are sealed
by sealing between the outer ends and the inner ends
of the outer and inner cannulas.

Thus, it is an object of the present inven-
tion to provide a novel talking tracheostomy tube.

15 It is further an object of the present inven-
tion to provide such a novel talking tracheostomy
tube which provides a source of air to the larynx of
the patient which is separate and independent from
the ventilator.

20 It is further an object of the present inven-
tion to provide such a novel talking tracheostomy
tube which minimizes or eliminates discomfort created
by high air flows directed into the trachea towards
the larynx.

25 It is further an object of the present inven-
tion to provide such a novel talking tracheostomy
tube which prevents air leaks through the stoma and
reduces the chances of subcutaneous emphysema in recent
tracheostomys.

30 It is further an object of the present inven-
tion to provide such a novel talking tracheostomy
tube which is easy to clean and routinely maintain.

It is further an object of the present inven-
tion to provide such a novel talking tracheostomy
35 tube wherein the passageway for the phonating air or
oxygen is formed internally of the tracheostomy tube
and does not require components which are consuming
in time, labor, or material to manufacture or assemble.

It is further an object of the present inven-

1 tion to provide such a novel talking tracheostomy tube which maximizes material, is simple in design, and is easy to manufacture and assemble.

5 These and further objects and advantages of the present invention will become clearer in the light of the following detailed description of an illustrative embodiment of this invention described in connection with the drawings.

DESCRIPTION OF THE DRAWINGS

10 The illustrative embodiment may best be described by reference to the accompanying drawings where:

Figure 1 shows a talking tracheostomy tube according to the teachings of the present invention
15 as it may be located in the neck of a patient.

Figure 2 shows a partial cross sectional view of the talking tracheostomy tube of Figure 1.

Figure 3 shows an exploded, partial cross sectional view of the talking tracheostomy tube of
20 Figure 1.

Figure 4 shows an enlarged, partial cross sectional view of the talking tracheostomy tube of Figure 1.

Figure 5 shows a cross sectional view of
25 the talking tracheostomy tube of Figure 1 according to section line 5-5 of Figure 3.

Figure 6 shows a cross sectional view of the talking tracheostomy tube of Figure 1 according to section line 6-6 of Figure 4.

30 Figure 7 shows a top view of the talking tracheostomy tube of Figure 1.

Figure 8 shows a partial cross sectional view of the talking tracheostomy tube of Figure 1.

35 All figures are drawn for ease of explanation of the basic teachings of the present invention only; the extensions of the figures with respect to number, position, relationship, and dimensions of the parts to form the preferred embodiment will be explained.

Where used in the various figures of the

1 drawings, the same numerals designate the same or
similar parts in the talking tracheostomy tube. Fur-
thermore, when the terms "first", "second", "upper",
"inner", "outer", "outside", "inside", and similar
5 terms are used herein, it should be understood that
these terms have reference only to the structure shown
in the drawings as it would appear to a person viewing
the drawings and are utilized only to facilitate
describing the present invention.

10 DESCRIPTION

A talking or speaking tracheostomy tube
according to the teachings of the present invention
is shown in the Figures and generally designated 10.
Tube 10 in a preferred form generally includes an
15 outer cannula 12, an inner cannula 14, a first sealing
member shown in its most preferred form as an inflatable
low pressure cuff 16, a second sealing member shown
in its most preferred form as an inflatable low pressure
cuff 18, and a neck flange 20.

20 In a preferred embodiment of the present
invention, outer cannula 12 is arcuate in shape and
formed of a semi-rigid, thin walled tube having an
outside surface 24, an inside surface 26, a first,
inner end 28, and a second, outer end 30. Cuff 16 is
25 attached to outside surface 24 of outer cannula 12 in
a sealed manner adjacent end 28. For inflating cuff
16, a pilot balloon assembly 32 and filling tube 34
are provided in the preferred embodiment of the present
invention. Filling tube 34 is in air communication
30 between assembly 32 and cuff 16. Assembly 32 includes
an inflatable bladder and check valve assembly actuated
by a hypodermic syringe. As is well known in the
art, cuff 16 may be inflated or deflated utilizing a
hypodermic syringe, not shown, for pressurizing or
35 depressurizing assembly 32. It should then be noted
that filling tube 34 may be imbedded in the wall of
outer cannula 12 so that no obstructions are presented
on outside surface 24 of cannula 12, if desired.

Cuff 18 is attached to outside surface 24

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1 of outer cannula 12 in a sealed manner in a spaced
relation from cuff 16 and end 30. For inflating cuff
18, a pilot balloon assembly 36 and a filling tube
38 are provided in the preferred embodiment of the
5 present invention. Filling tube 38 is in air communi-
cation between assembly 36 and cuff 18. As is well
known in the art, cuff 18 may be inflated and deflated
utilizing a hypodermic syringe, not shown, for pressur-
izing or depressurizing assembly 36. It should then
10 be noted that filling tube 38 may be imbedded in the
wall of outer cannula 12 so that no obstructions are
presented on outside surface 24 of cannula 12, if
desired.

Located immediately superior to cuff 16,
15 tube 10 further includes in the preferred embodiment
of the present invention an array of air exit ports
40 extending through the upper wall of cannula 12.
In its most preferred form, the array includes eight
ports 40 placed in an area 1.4 centimeters by 0.7
20 centimeters. In the preferred embodiment, ports 40
have diameters of 1.5 millimeters and are direction-
ally drilled and in the most preferred form are along
an axis which is generally parallel to a tangent of
the curved shape of cannula 12.

25 In the preferred embodiment of the present
invention, collar 42 is integrally formed on end 30
of cannula 12. Collar 42 in its most preferred form
includes an outer axially extending internal inner
recess 44 terminating in an axially extending
30 internal inner recess 46 having a lesser diameter
forming an abutment shoulder 48 therebetween. In its
most preferred form, neck flange 20 is integrally
formed on collar 42. In the preferred embodiment of
the present invention, tube 10 may be secured to the
35 neck of a patient by abutting flange 20 against the
neck of the patient when tube 10 is inserted into
the trachea and a neck strap 50 may be passed around
the neck of the patient and having its ends secured
to the opposite ends of flange 20.

1 For insertion of cannula 12, an obturator
52 is provided in the preferred embodiment of the
present invention as best seen in Figure 8. Obturator
52 is arcuate in shape and complementary to the shape
5 of and for receipt into inside surface 26 of cannula
12. In its preferred form, obturator 52 includes a
first, handle end 54, a second, enlarged rounded end
56 and has a length slightly longer than cannula 12
such that end 56 extends slightly past end 28 of cannula
10 12. In its most preferred form, end 56 has a cross
section which is complementary to the cross section
of cannula 12 adjacent end 28 and has a size substan-
tially equal to and for slidable receipt within inside
surface 26 of cannula 12 adjacent end 28. Obturator
15 52 further includes in its most preferred form an
abutment plate 58 spaced from end 54 for abutment
with shoulder 48 of collar 42 to prevent further inser-
tion of obturator 52 and to allow ease of removal of
obturator 52 from outer cannula 12. End 28 may be
20 rounded in a complementary manner to end 56 of obturator
52. Thus, the inner end of tube 10 having obturator
52 inserted presents a smooth insertion surface formed
by end 56 of obturator 52 and end 28 of cannula 12.

With cuffs 16 and 18 deflated and with obtur-
25 ator 52 located within cannula 12 as best seen in
Figure 8, cannula 12 may be inserted in the incision
of the neck of the patient and into the trachea until
flange 20 abuts with the neck of the patient. Strap
50 may then be attached and obturator 52 removed.
30 Cuff 16 may then be pressurized in the manner set forth
hereinbefore for generally sealing cannula 12 with the
trachea as best seen in Figure 1. When desired, cuff
18 may be pressurized in the manner set forth herein-
before for generally sealing cannula 12 with the stom-
35 ach of the patient as best seen in Figure 1.

In the preferred embodiment of the present
invention, inner cannula 14 is formed of a semi-forth
thin walled tube having a first end 60 and a second
end 62. Inner cannula 14 is arcuate in shape and

1 complementary to and for receipt into inside surface
26 of outer cannula 12. The diameter of cannula 14
is approximately equal to the diameter of inside
surface 26 of outer cannula 12. However, as best
5 seen in Figure 6, in its most preferred form cannula
14 has a truncated circular cross section. Specifi-
cally, in its most preferred form, cannula 14 includes
a flat surface 76 which extends along a chord of the
circular cross section of cannula 14. An air passage-
10 way 64 is formed between surface 76 of inner cannula
14 and inside surface 26 of outer cannula 12 in the
preferred embodiment of the present invention.

Air communication is provided to passageway
64 in the preferred embodiment of the present invention
15 by an air control valve or suction catheter 66, such
as by a thumb valve shown, having an inlet 67 in fluid
communication with a source of pressurized air or
oxygen, not shown, and an air line 68. In the most
preferred form, an air inlet 70 is formed in collar
20 42 in fluid communication with inner recess 46 which
in turn is in fluid communication with passageway 64.
Air ports 40 are further in communication with passage-
way 64. Valve 66 includes a first outlet 72 and a
second outlet 74. Air line 64 is in fluid communica-
25 tion with inlet 70 and outlet 74. Thus, pressurized
air or oxygen may be supplied through ports 40 when
outlet 72 is blocked such as by the thumb of a person.
When it is not necessary to supply air or oxygen
through ports 40, outlet 72 is not blocked allowing
30 the air or oxygen to freely escape to the environment
through outlet 72.

In the preferred embodiment of the present
invention for providing a sealed inner end of passageway
64, inside surface 26 of outer cannula 12 is formed
35 with a sealing obstruction 78 adjacent end 28 as best
seen in Figure 5. Specifically, the cross section of
cannula 12 through obstruction 78 is complementary to
and for the sealing receipt of the cross section of
cannula 14. Thus, a sealing relationship may be formed

1 between end 28 of cannula 12 and end 60 of cannula 14 :
when cannula 14 is located within cannula 12.

Tube 10 in the preferred embodiment of the
present invention includes a collar 80 integrally
5 formed on end 62 of inner cannula 14. In its most
preferred form, collar 80 includes an integral abutment
washer or plate 82 for sealing engagement with shoulder
48 of collar 42. Thus, washer 82 and shoulder 48 of
collar 42 provides a sealed outer end of passageway
10 64. Collar 80 further includes a male snap connector
84 in its most preferred form.

Tube 10 further includes in the preferred
embodiment of the present invention a connector 86
for possible connection to a line, not shown, of pres-
15 surized air or oxygen for supplying air or oxygen for
communication through cannula 14, through the trachea,
to the lungs of patient. Connector 86 includes in
its most preferred form a female snap connector for
releasable sealing with connector 84 of collar 80 of
20 cannula 14.

In the preferred embodiment of the present
invention, at least one pin 88 is formed on connector
86 of cannula 14 for locking receipt into complementary
slots 90 formed in collar 42 of cannula 12 for locking
25 cannula 14 within cannula 12. In its most preferred
form, slot 90 is I-shaped such that for insertion and
locking of cannula 14 into cannula 12, it is neces-
sary to first push cannula 14 into cannula 12 and
then to twist or turn cannula 14 in cannula 12 such
30 that pin 88 travels along the leg of slot 90 and then
is twisted into the other leg of slot 90. Thus, the
locking mechanism of the present invention insures a
sealing engagement of washer 82 of collar 80 with
shoulder 48 of collar 42 and of end 60 of cannula 14
35 with end 28 of cannula 12.

Now that the construction of tube 10 of the
present invention has been explained, subtle features
and advantages of the present invention can be set
forth and appreciated. With cuff 16 inflated in the

1 tracheostomy of the patient, tracheostomy tube 10 of
the present invention functions in a similar manner
as prior tracheostomy tubes; however, tracheostomy
tube 10 according to the teachings of the present
5 invention obtains advantages over prior tracheostomy
tubes and further allows the patient to talk, when
desired. Specifically, cuff 18 may be inflated util-
izing balloon assembly 36 as set forth hereinbefore.
Cuff 18 seals off any reflux of air around tracheostomy
10 tube 10 through the stoma of the patient. Valve 66
may be actuated, for example by placing a thumb over
outlet 72, such that pressurized air or oxygen is
supplied through passageway 64 and through ports 40
formed in outer cannula 12. Air released through
15 ports 40 is directed upwardly into the trachea and
toward the larynx of the patient such that the patient
is free to phonate and communicate at will. It is
recommended that cuff 18 should be deflated and not
be inflated when it is not desired to utilize tube 10
20 in a talking function to avoid possible irritation or
discomfort.

If air is directed towards the walls of the
trachea or at a large velocity, discomfort may be
produced. Ports 40 in the preferred embodiment are
25 directionally drilled to specifically direct the air-
stream upwards in the trachea toward the larynx and
away from and not at the back wall of the trachea.
Furthermore, the large numbers of ports 40 in the
array baffle the airstream, reduce its velocity, dif-
30 fuse delivery, and allow a more natural air column to
stream upwards towards the larynx. Additionally, the
large number and area of ports 40 also avoids problems
of blockage by secretions if only a single port
would have been provided. Therefore, tube 10 accord-
35 ing to the teachings of the present invention alleviates
discomfort to the patient which occurred in prior talk-
ing tracheostomy tubes and does not require additional
components such as air skirts. In fact, tube 10 of
the present invention may be utilized at high flow

1 rates (i.e. greater than 5 liters per minute) through
ports 40. In the preferred embodiment of the present
invention, a flow rate of 6 to 8 liters per minute
through ports 40 is recommended. At flow rates below
5 this, the rate and volume of speech may be unsatisfactory;
while higher flow rates may cause drying of tracheal mucosa.

In the preferred embodiment of the present
invention, cuff 18 prevents leakage of air around
tracheostomy tube 10 through the stoma and thus insures
10 that air introduced to the trachea through ports 40
travel to the larynx for vocalization purposes and
does not merely escape from the trachea as was common
in prior talking tracheostomy tubes. Further, unneces-
sary stomal emission and subcutaneous emphysema may
15 be prevented utilizing cuff 18 of the present invention.

It should further be appreciated that a
separate source of air or oxygen from the normal ven-
tilating source of air flowing through inner cannula
14 is provided in the preferred embodiment by utilizing
20 valve 66, line 68, passageway 64 and ports 40. Thus,
talking by a patient utilizing tracheostomy tube according
to the present invention is not intermittent, is not
dependent on the phase of the respirator, does not in
any way interfere with the ventilation of the patient
25 through inner cannula 14 such as to cause aspiration,
and does not interfere with the measurement of air
return during speech. Furthermore, tracheostomy tube
10 according to the teachings of the present invention
has no moving parts and thus is not prone to mechanical
30 failures such as the failure of valves as was common
in valve fenestrated tracheostomy tubes.

Thus, utilizing tube 10 according to the
teachings of the present invention provides a flow of
air or oxygen to the larynx so that the patient can
35 vocalize words in the usual manner, producing a natural
sounding laryngeal speech complete with the patient's
own tonal qualities.

Furthermore, in addition to the advantages
of laryngeal speech obtained by the present invention,

1 some of which have been set forth hereinbefore, tracheos-
tomy tubes according to the teachings of the present
invention obtain many other advantages over existing
tracheostomy tubes of either the talking or non-talking
5 type. For example, forming the cannula of tube 10 by
an outer cannula 12 and an inner cannula 14 has several
advantages. Specifically, it is not necessary to
remove the entire tube 10 for clearing dried secretions
from tube 10, but rather it is only necessary to
10 remove inner cannula 14 while outer cannula 12 remains
in position. Thus, it is not necessary to reinsert
outer cannula 12 whenever it is necessary to clear or
otherwise provide routine care to tracheostomy tube
10. Furthermore, it should be noted that cannula 14
15 does not in any way interfere with the ventilation of
the patient utilizing tube 10 of the present invention.

It should be noted that forming passageway
64 between inner cannula 14 and outer cannula 12 obtains
several advantages. For example, the number of compo-
20 nents are reduced and thus the steps of assembly are
also less. The outer insertion surface of tube 10
does not include any interfering or protruding objects
which could interfere with insertion of tube 10 or
produce discomfort with tube 10 in place since passage-
25 way 64 is located internally of tube 10. Furthermore,
it is not necessary to have passageway 64 formed inte-
grally in cannula 12 or cannula 14 which would make
their manufacture more expensive. Thus, the preferred
form of the present invention obtains several advantages.

30 It can then also be appreciated that tracheos-
tomy tube 10 of the preferred embodiment of the present
invention is easy to manufacture and assemble, and
lends itself to mass production techniques.

Now that the basic teachings of the present
35 invention have been explained, many extensions and
variations will be obvious to others having ordinary
skill in the art. For example, many of the construc-
tional features of the present invention have and
obtain advantages over existing tracheostomy tubes.

1 However, the substitution of equivalent or similar
structure will be well-known to a person skilled in
the art after the teachings of the present invention
become known. For example, the structure utilized
5 for locking inner cannula 14 in outer cannula 12 as
shown and described can be accomplished by other struc-
ture and means which may become known to persons skilled
in the art after the present invention becomes known.

Although the sealing members are shown in
10 its preferred forms as cuffs 16 and 18 and cuffs 16
and 18 are inflated by utilizing assemblies 32 and 36
and tubes 34 and 38, respectively, other forms and
constructions of sealing members and/or inflation and
deflation methods can be utilized after the teachings
15 of the present invention become known.

Additionally, although the manner and method
of sealing between the inner and outer ends of the
inner and outer cannulas are preferred and believed to
be advantageous over the art, other manners and methods
20 of sealing may become known after the teachings of
the present invention become known.

Likewise, the particular structure shown in
the preferred embodiment of the present invention for
providing air to inner cannula 14 and to passageway
25 64 is believed to be advantageous but other structures
and methods will be within the skill of the art after
the teachings of the present invention become known.

Although insertion of tube 10 is shown utiliz-
ing obturator 54, other forms and methods of insertion
30 can be utilized according to the teachings of the
present invention.

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1 Thus since the invention disclosed herein
may be embodied in other specific forms without departing
from the spirit or the general characteristics thereof,
some of which forms have been indicated, the embodiments
5 described herein are to be considered in all respects
illustrative and not restrictive. The scope of the
invention is indicated by the appended claims rather
than by the foregoing description, and all changes
which come within the meaning and range of equivalency
10 of the claims are intended to be embraced therein.

What is claimed is:

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1. In a tracheostomy tube for insertion through an incision in the neck of a patient and into the trachea to support breathing including a cannula having a first end for placement within the trachea for directing air or oxygen towards the lungs of the patient and a second end located outside of the trachea and the neck of the patient for receiving air or oxygen, and first means for sealing between the cannula and the trachea for substantially preventing air or oxygen from escaping from the first end of the cannula upward in the trachea towards the larynx, with the improvement comprising means for allowing the patient utilizing a tracheostomy tube to phonate comprising, in combination: second means for introducing air or oxygen above the first sealing means in the trachea for movement towards the larynx of the patient; and third means for sealing between the cannula and the stoma of the patient for preventing the air or oxygen introduced by the second means from escaping through the stoma in the neck of the patient around the cannula of the tracheostomy tube.

2. The tracheostomy tube of claim 1 wherein the cannula includes an outer cannula having an outer end, an inner end, an outside surface, and an inside surface and a removable inner cannula having an outer end, an inner end, an outside surface, and an inside surface defining the tracheostomy tube passageway, with the inner cannula having a shape complementary to and for receipt within the inside surface of the outer cannula; and wherein the second means comprises, in combination: a secondary passageway formed between the outside surface of the inner cannula and the inside surface of the outer cannula; means for introducing air or oxygen to the secondary passageway; and at least one port formed in the outer cannula for fluid communication between the secondary passageway and the trachea for movement of the air or oxygen above the first sealing means in the trachea towards

the larynx of the patient.

3. In a tracheostomy tube for insertion through an incision in the neck of a patient and into the trachea to support breathing including a cannula having a first end for placement within the trachea for directing air or oxygen towards the lungs of the patient and a second end located outside of the trachea and the neck of the patient for receiving air or oxygen, and first means for sealing between the cannula and the trachea for substantially preventing air or oxygen from escaping from the first end of the cannula upward in the trachea towards the larynx, with the cannula including an outer cannula having an outer end, an inner end, an outside surface, and an inside surface and a removable inner cannula having an outer end, an inner end, an outside surface, and an inside surface defining the tracheostomy tube passageway, with the inner cannula having a shape complementary to and for receipt within the inside surface of the outer cannula, with the improvement comprising means for allowing the patient utilizing a tracheostomy tube to phonate comprising, in combination: a secondary passageway formed between the outside surface of the inner cannula and the inside surface of the outer cannula; second means for introducing air or oxygen to the secondary passageway; and at least one port formed in the outer cannula above the first means for fluid communication between the secondary passageway and the trachea for introducing air or oxygen above the first sealing means in the trachea for movement towards the larynx of the patient.

4. The tracheostomy tube of claim 3 further comprising, in combination: third means for sealing between the cannula and the stoma of the patient for preventing the air or oxygen introduced into the trachea through the port from escaping through the stoma in the neck of the patient around the cannula of the

tracheostomy tube.

5. The tracheostomy tube of claim 1 or 4 wherein the third means comprises, in combination: a low pressure, inflatable cuff attached to the cannula in a sealed manner; and fourth means for inflating the cuff to abut and seal with the stoma of the patient and for deflating the cuff to allow the cuff to generally assume the shape of the cannula for introduction of the cannula into the incision of the neck of the patient.

6. The tracheostomy tube of claim 5 wherein the fourth means comprises, in combination: a pilot balloon assembly and a filling tube in fluid communication with the cuff and the balloon assembly wherein air can be introduced or removed from the pilot balloon assembly by a hypodermic syringe for inflating and deflating the cuff.

7. The tracheostomy tube of claim 2 or 3 wherein the port is directionally formed in the outer cannula to direct the air upwards in the trachea towards the larynx and away from the walls of the trachea.

8. The tracheostomy tube of claim 2 or 3 including an array of ports to baffle and reduce the velocity of the air or oxygen introduced in the trachea above the first sealing means to allow a more natural flow of the air or oxygen to the larynx of the patient.

9. The tracheostomy tube of claim 2 or 3 wherein the cross section of the outer cannula is generally circular in shape and the cross section of the inner cannula is generally circular in shape but having a flat surface along a chord of the circular cross section, with the secondary passageway being formed between the inside surface of the outer cannula and the flat surface of the outside surface of the inner cannula, and wherein the tracheostomy tube further includes

means for sealing the outside surface of the inner cannula and the inside surface of the outer cannula adjacent the outer ends of the inner and outer cannulas and means for sealing the outside surface of the inner cannula and the inside surface of the outer cannula adjacent the inner ends of the inner and outer cannulas.

10. The tracheostomy tube of claim 9 wherein the sealing means between the outer ends of the inner and outer cannulas comprises, in combination: a collar formed on the outer end of the outer cannula having at least one internal recess defining an abutment and sealing shoulder; and a collar formed on the outer end of the inner cannula for receipt in the internal recess of the outer cannula and having an abutment and sealing surface for abutting and sealing with the abutment and sealing shoulder of the outer cannula.

11. The tracheostomy tube of claim 10 further comprising, in combination: means for locking the inner cannula with the outer cannula comprising a locking slot formed in the collar of the outer cannula; and a pin operatively attached to the inner cannula for locking receipt in the locking slot of the outer cannula.

12. The tracheostomy tube of claim 9 wherein the sealing means between the inner ends of the inner and outer cannulas comprises, in combination: a sealing obstruction formed integrally with the inside surface of the outer cannula adjacent the inner end for shaping the cross section of the outer cannula to be complementary to and for the sealing receipt of the inner cannula.

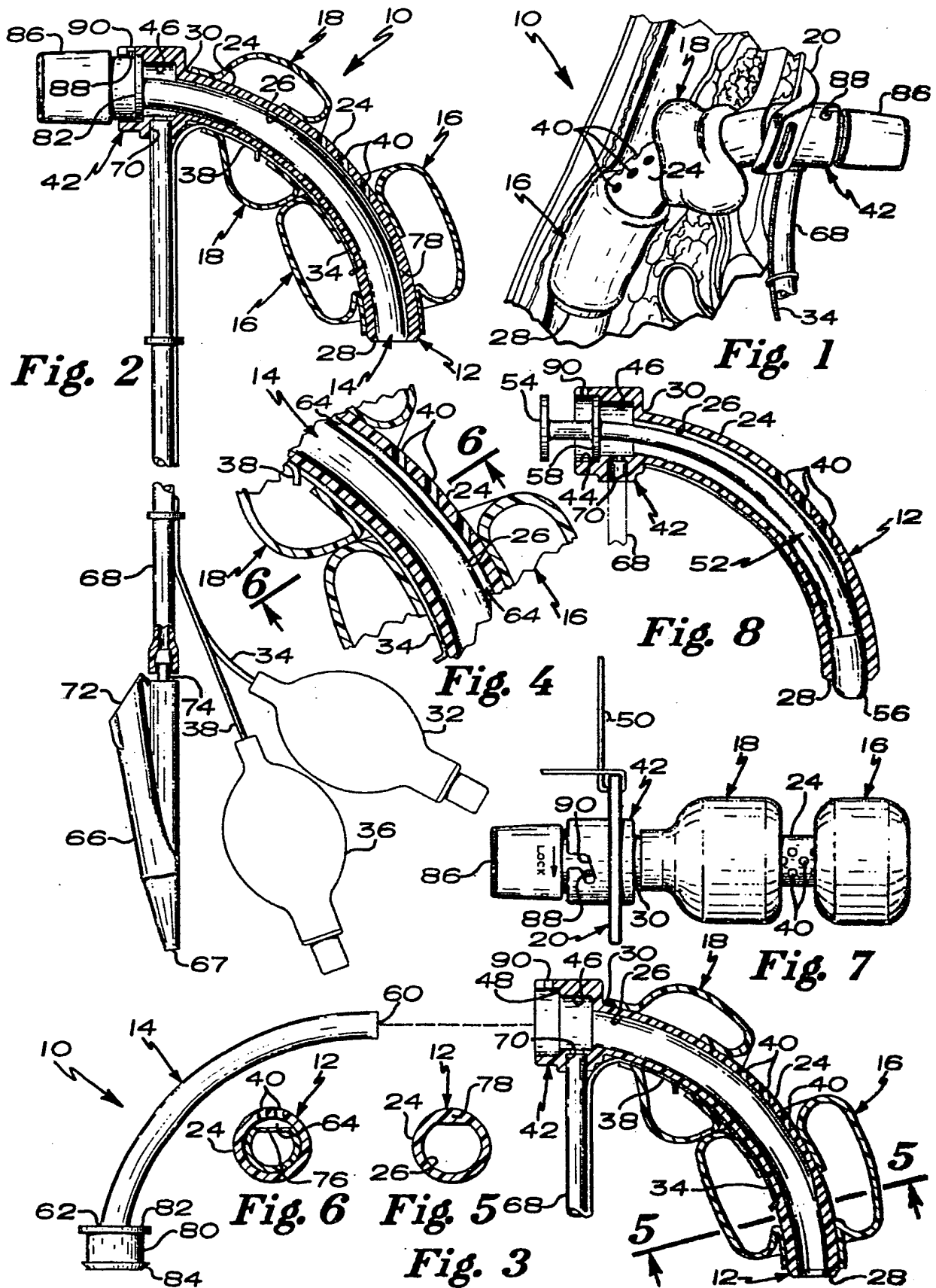
13. The tracheostomy tube of claim 2 or 3 wherein the means for introducing air or oxygen to the secondary passageway comprises, in combination: a suction catheter including an inlet in fluid communication with a source of pressurized air or oxygen, a first outlet open to

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the environment, and a second outlet; and means for providing fluid communication between the secondary passageway and the second outlet of the suction catheter.

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European Patent
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EUROPEAN SEARCH REPORT

Application number

EP 83 63 0144

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. *)
X, A	DE-B-1 248 230 (PESTY) * Whole document *	1-3, 7-9	A 61 F 1/20 A 61 M 16/00
A	US-A-3 889 688 (EAMKAOW) * Claim 1; figure 1 *	4, 5, 6	
A	US-A-4 033 353 (LA ROSA) * Figures 1, 2 *	6, 9-12	
A	FR-A-2 513 113 (DELACROIX-CHEVALIER) * Figure 2 *	6, 9-11	
A	US-A-4 280 492 (LATHAM)		
A	US-A-3 693 624 (SHILEY et al.)		TECHNICAL FIELDS SEARCHED (Int. Cl. *)
A	US-A-2 198 241 (BREHM)		A 61 F 1/00 A 61 M 16/00
A	CH-A- 408 292 (NEUENSCHWADER)		
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 05-12-1983	Examiner KANAL P K

CATEGORY OF CITED DOCUMENTS

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